USER'S MANUAL

REV.02

ENGLISH

www.k-array.com

K Array Line

KH4/KS4/KH15

SAFETY INSTRUCTIONS

CAUTION

This symbol, wherever it appears, alerts you to important operating and maintenance istructions in the accompanying literature. Read the manual!

Detailed Safety and Operation Instructions:
All the operation instructions and safety should be read before the machine is operated.

Follow instructions:
All operation and user instructions should be followed by the user or the installer.

Retain Instructions:
The safety and operating instructions should be carefully retained for future reference.

Heed Warnings:
All warnings on the machine and in the operating instructions should be adhered to.

Water and Moisture:
The machine should not be used near water or in place full of moisture.

Ventilation:
The machine should be placed so that its location does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, carpet, or similar surface that may create an obstacle for the ventilation openings: or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air around the machine.

Heat:
The machine should be situated far away from heat sources such as heat registers, radiators, stoves, or other machines (including amplifiers) that produce heat.

Power-Cord Protection:
Power supply cord should be routed so that it is not likely to be walked on or pinched by items placed upon or against it, paying particular attention to cords.

Cleaning:
The machine should be cleaned only as recommended by the manufacturer.

Object and Liquid Entry:
Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings, do not leave bottles or cans upon the unit.

Damages that Require Service:
The unit should be serviced by qualified service personnel in the following cases:
1. The external power cord or the plug has been damaged.
2. The enclosure of the unit has been damaged.
3. The unit has been exposed to water or moisture.
4. The unit does not appear to operate normally or exhibits a marked change in performance.
5. Objects have fallen, or liquid has been spilled into the unit.

Servicing:
The user should not attempt to service the unit beyond what is described in the Operating Instructions. All other servicing should be referred to qualified and authorized service personnel.

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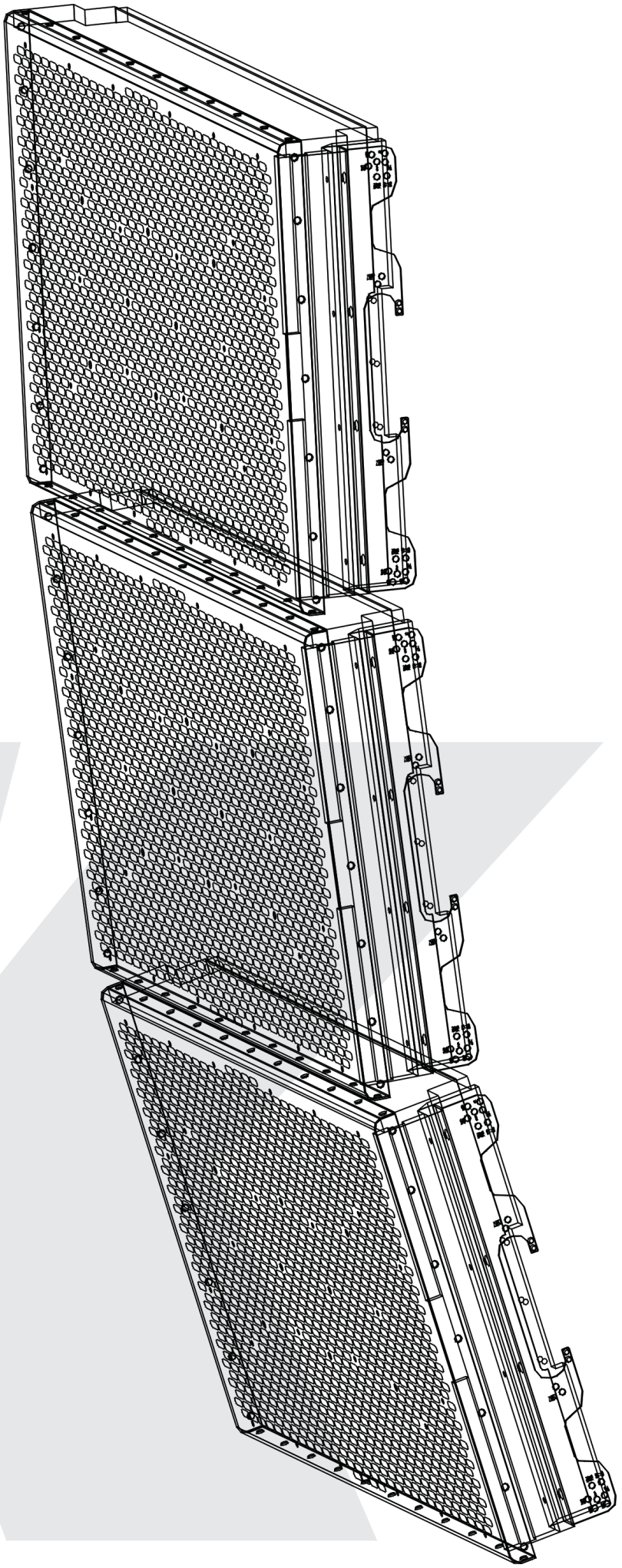
K-array is the new voice that sings aloud, "outside the chorus", and whose performance is better than any other products. Born on-the-road, in the PA world, where you get no discount, you have to give your best as fast as you can, often with a "compressed" budget, K-Array systems have been designed to give precise answers to precise needs. K-Array systems are driven by new generation digital engines, with power/dimension/weight ratios that are ten times better than any other professional products; these systems can be remotely controlled and come with a lot of on-board software. K-array systems can shape their performance following your taste and needs. Inside K-array systems you will find something that only K-array can offer: the best in technology, proudly conceived, designed and produced in Italy. If they were cars, they would be Ferrari. Don't agree to pay for a simple brand, claim performance, and don't believe those who maintain that these products are only for few people, the only truth is that K-array systems are unique, but affordable and within everybody's reach!

HP Sound Equipment



2. AC POWER DISTRIBUTION

All amplifier modules and the rest of the audio equipment connected to it (mixing consoles, processors, etc.) must be connected to the AC power distribution in a properway, preserving AC line polarity and connecting earth ground such that all grounding points are connected to a single node or common point using the same cable gauge as the neutral and line(s) cables. Bad grounding connections between speakers and the rest of the audio system may produce noise, hum and/or serious damage to the input/output stages in the system's electronic equipment.

CAUTION

Before applying AC to any K-array self-powered speaker, be sure that the voltage potential difference between neutral and earth ground is less than 5 VAC.

3. VOLTAGE REQUIREMENTS

The KH4 or KS4 operates safely and without audio discontinuity if the AC voltage stays within either of two operating windows: 95-125 or 195-250 V, at 50 or 60 Hz.

WHEN YOU SWITCH ON THE UNIT:

The main power supply slowly ramps on t he green display on the user panel lights up, and the green leds on the left side lights up flashing, indicating that the system is enabled and ready to process audio signals

CAUTION

If the Display does not illuminate or the system does not respond to audio input after ten seconds, remove AC power immediately. Verify that the voltage is within the proper range. If the problem persists please contact HP Sound Equipment or an authorized service center.

NOTE

It is recommend that the supply be operated in the rated voltage windows, at least a few volts away from the turn on/off points so that small AC voltage variations do not cause the amplifier to cycle on and off.

4. CURRENT REQUIREMENTS

The KH4 or KS4 presents a dynamic load to the AC mains, which causes the amount of current to fluctuate between quiet and loud operating levels. Since different cables and circuit breakers heat up at varying rates, it is essential to understand the types of current ratings and how they correspond to circuit breaker and cable specifications. The maximum continuous RMS current is the maximum RMS current in a period of at least ten seconds. It is used to calculate the temperature increase in cables, which is used to select cables that conform to electrical code standards. It is also used to select the cable size and gauge and the rating for slow-reacting thermal breakers. The maximum burst RMS current is the maximum RMS current in a period of approximately one second. It is used to select the rating for most magnetic breakers. The maximum instantaneous peak current during burst is used to select the rating for fast-reacting magnetic breakers and to calculate the peak voltage drop in long AC cables according to the formula:

V pk (drop)= I pk x R (cable total)

For best performance, the AC Cable voltage drop should not exceed 10 Volts, or 10% at 115V and 5% at 230V. Use Table 1 below as a guide when selecting cable gauge size and circuit breaker ratings for your operating voltage.

The minimum electrical service amperage required by a system of KH4 or KS4 is the sum of their maximum continuous RMS current. We recommend allowing an additional 30% above the minimum amperage to prevent peak voltage drops at the service entry.

KH4 and KS4 Current Rating:

115 VAC = 20A Max Continuous RMS
230 VAC = 10A Max Continuous RMS

5. POWER CONNECTOR WIRING CONVENTIONS

The KH4 or KS4 requires a grounded outlet. It is very important that the system be properly grounded for both safety and proper operation. Use the following wiring diagram to create power cables and distribution systems.

CAUTION

The KH4 or KS4 requires a ground connection. Always use a grounding outlet when connecting these units.

CAUTION

Do not operate the unit if the power cables are frayed or broken.

CAUTION

Keep all liquids away from the KH4 or KS4 amplifiers to avoid hazards from electrical shocks.

6. CONNECTIONS

The KH4 or KS4 presents a 10k ohm balanced input impedance to a three-pin XLR connector with the following connectors:

- **pin1 = Ground**
- **pin2 = Signal +**
- **pin3 = Signal -**

CAUTION

Shorting an input connector pin to the case can form a ground loop and cause hum.

Pins 2 and 3 carry the input as a differential signal; pin 2 is hot relative to pin 3, resulting in a positive pressure wave when a positive signal is applied to pin 2. Use standard audio cables with XLR connectors for balanced signal sources. Make sure that pin 1 (shield) is always connected on both ends of the cable.

If abnormal noises such as hiss and popping are produced by the loudspeaker, disconnect the audio cable from the speaker. If the noise stops, then most likely the problem is not with the loudspeaker. Check the audio cable, source, and AC power for the source of the problem.

Audio signals can be easy-chained using the loop output connector on the user panel of the KH4 or KS4. A single source can drive multiple KH4 or KS4 with a paralleled input loop, creating an unbuffered hard-wired loop connection. When driving multiple KH4 or KS4 in an array, make certain that the source device can drive the total load impedance presented by the paralleled input circuit of the array. The audio source must be capable of producing a minimum of 20 dBV (10-Vrms into 600 ohms) in order to produce the maximum peak SPL over the operating bandwidth of the loudspeaker.

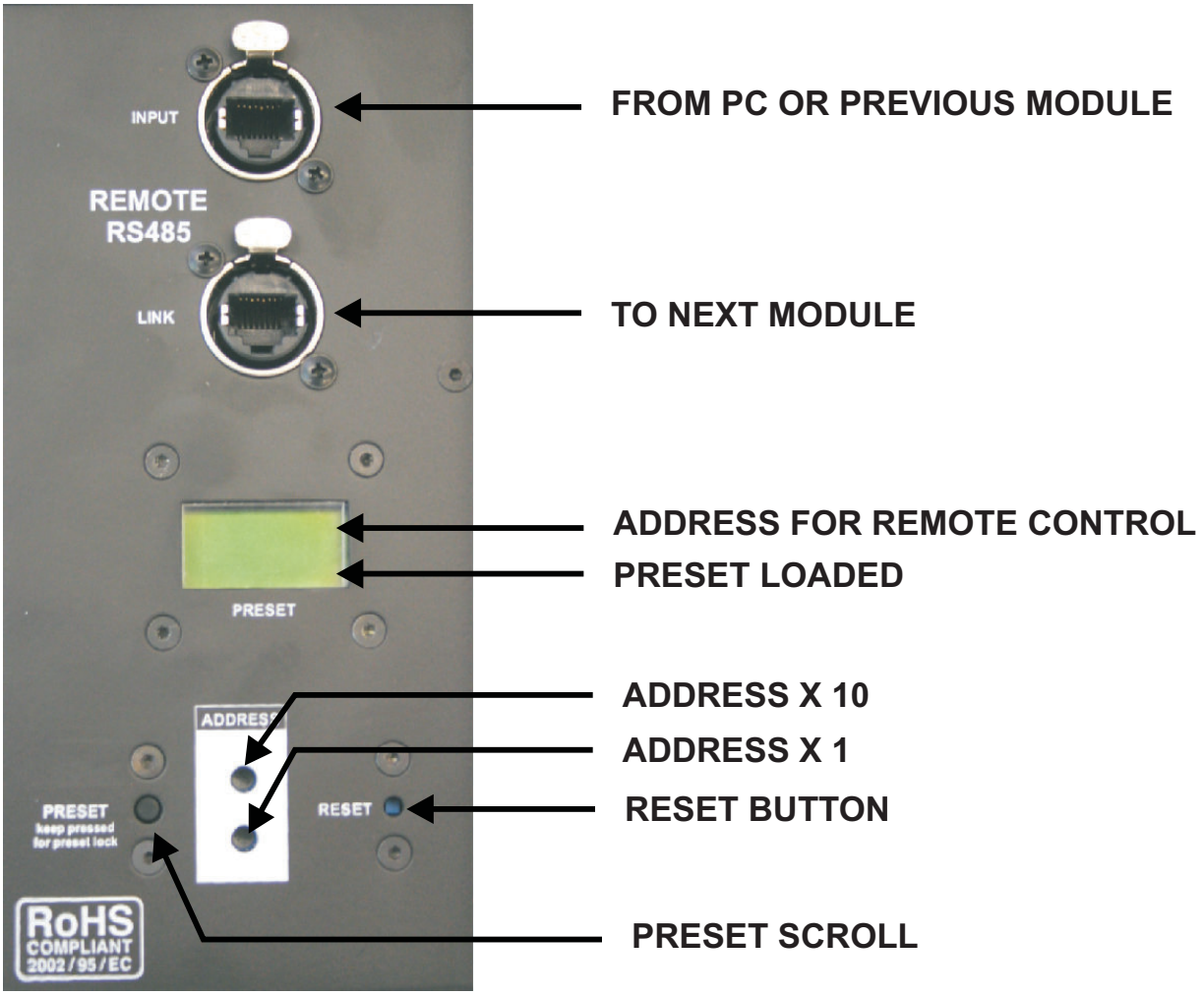
7. AMPLIFICATION AND PROTECTION CIRCUITRY

The KH4 or KS4 is powered by the K-array power amplifiers, a high-power eight-channel digital amplifiers (500 watts/ch. RMS) with a total power of 4000 watts. All the specific functions for the KH4 or KS4 such as crossovers, frequency, phase response, and driver protection are determined by a DSP processor installed inside the amplifier. All K-array loudspeakers are shipped with the drivers in correct alignment. However, if a driver needs to be replaced, make sure the replacement is reinstalled with the correct polarity. Incorrect driver polarity impairs the system performance and may damage the drivers.

8. DSP CONTROL & REMOTE CONTROL

KH4, KS4 and KH15 have a powerful DSP that manages all the functions of the speakers. Each system can store on board 16 preset that can be recalled pushing the PRESET button. Once the preset will appear on the lower line of the display it will become automatically available after few seconds. If you desire to set a preset as "default" you just need, once selected it, to keep pressed for five seconds the PRESET button. After that, this preset will automatically be recall each time you will switch on your module. It is also possible to remote each module by an RS485 serial port. In order to remote your system, you need to set each module on a different address, so that, in your chain, no one module will have the same address. Two rotary encoders allow you to set the desired address number that will appear on the top line of the display. Using the remote control software it is possible to mute each system, select a desired preset loaded on-board or download a new preset pack.

For remote control operation please refer to REMOTE CONTROL AND SOFTWARE MANUAL in the next pages.



CAUTION

Connecting more than 3 modules by RJ45 8 poles cable, the display of the last off module will start lighting.

CAUTION

To connect high quantity of modules together by remote control, it suggested to use K-array special 3 pole cables or XLR adapters.

9. DSP REMOTE CONTROL SOFTWARE

1 . To connect the K-array modules to a PC, it is needed a RS485 adapter, we recommend the K-USB adapter (pic.1).

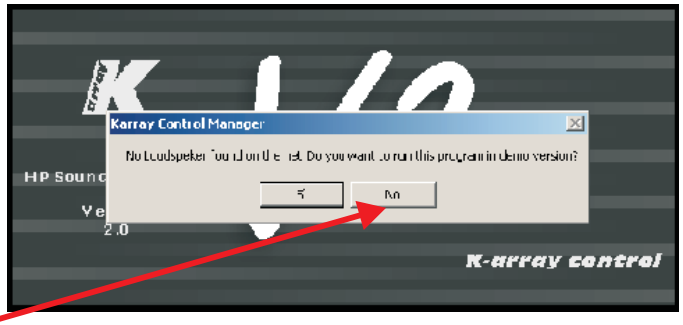
K-USB

USB to RS485 adapter

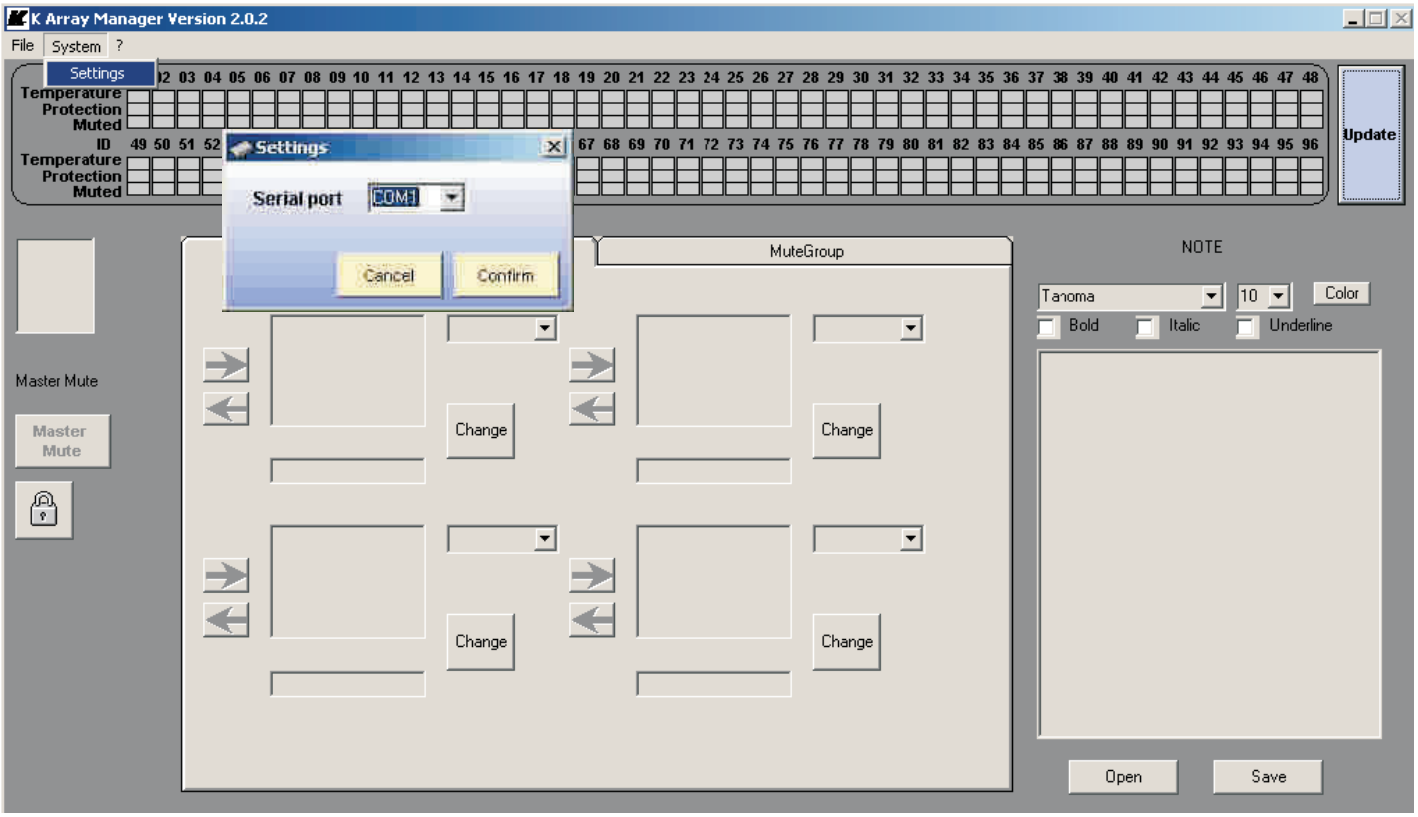
Connect the K-usb to a PC and install the drivers required included in the CD-ROM.

2 . Install the K array control software from installer in the CD-ROM

2.1 Start the Karray_manager_V2 from Windows - Start - Software - Karray_manager_V2

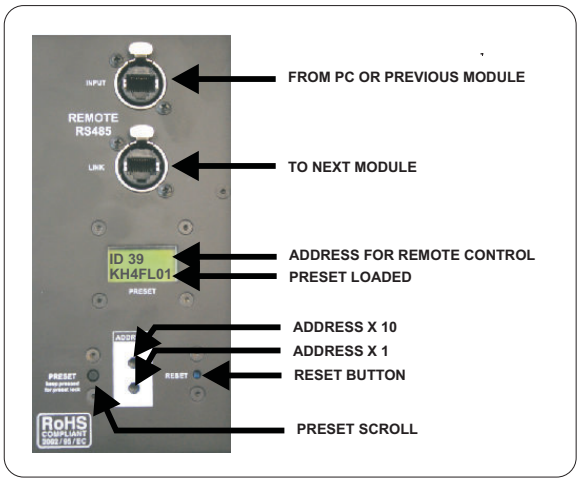


2.2 Click on NO when ask for demo mode start



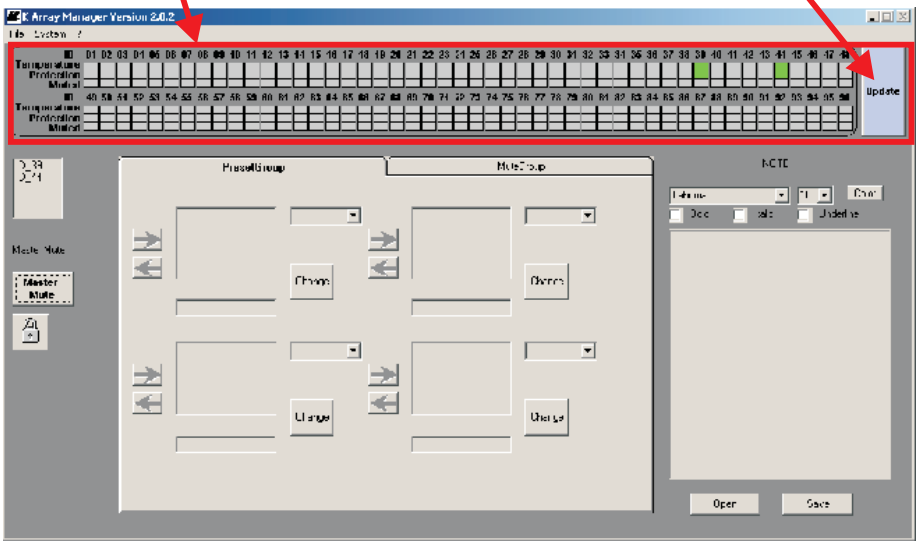
2.3 Click on System - Settings to configure which COM port use, the COM port of K-USB, usually is the higher number. If you don't find, you can check it on windows-control panel-system-hardware-COM Port

3 . ID setting

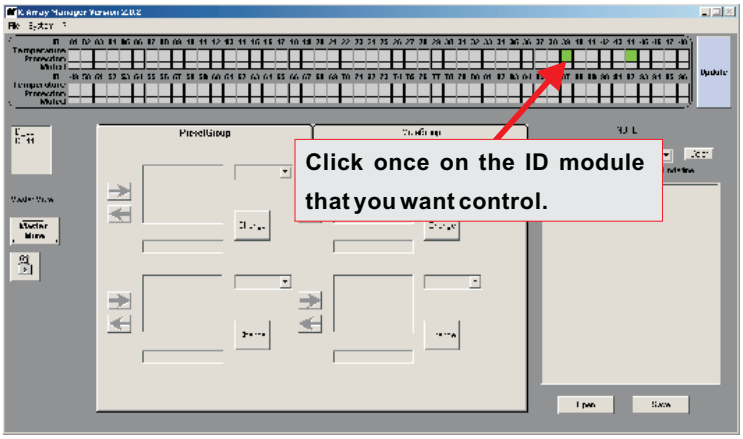


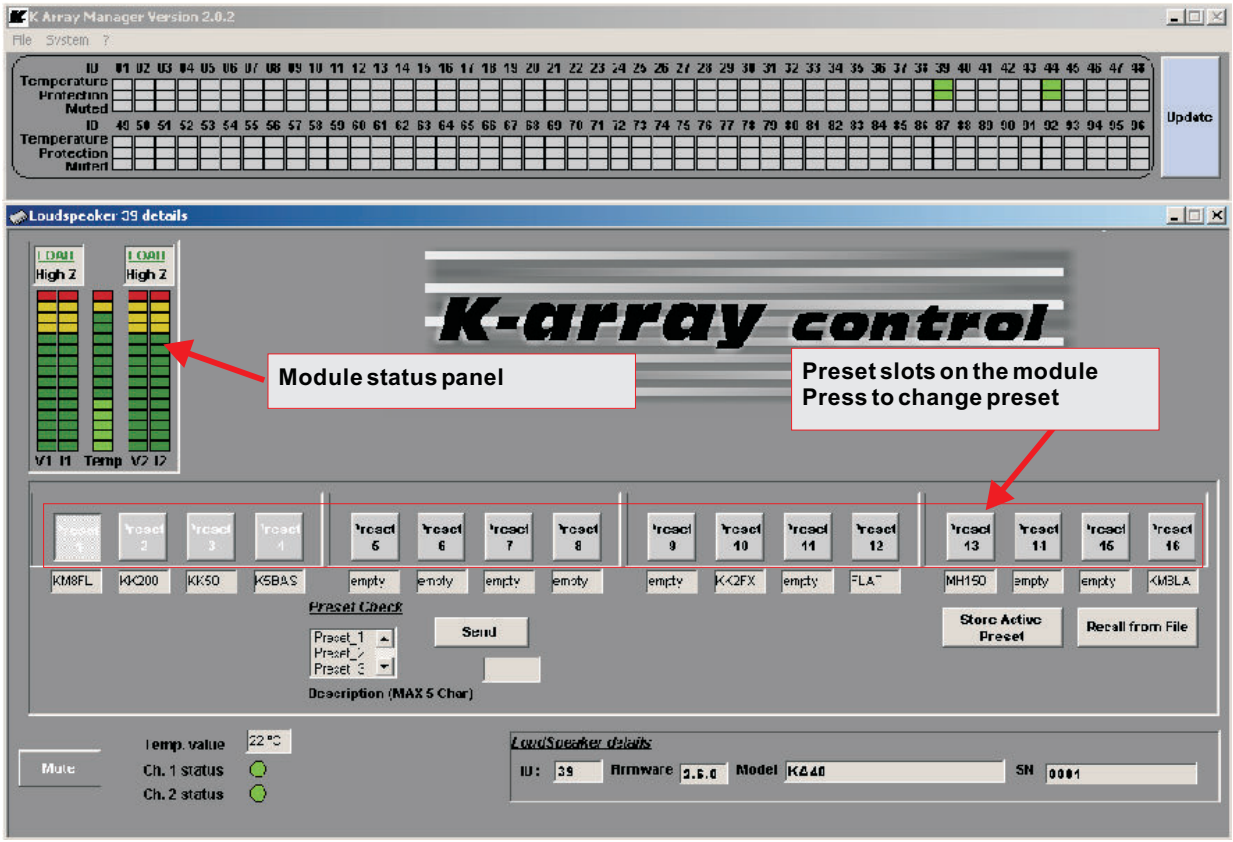
On this bars you can see all the modules connected in your net.

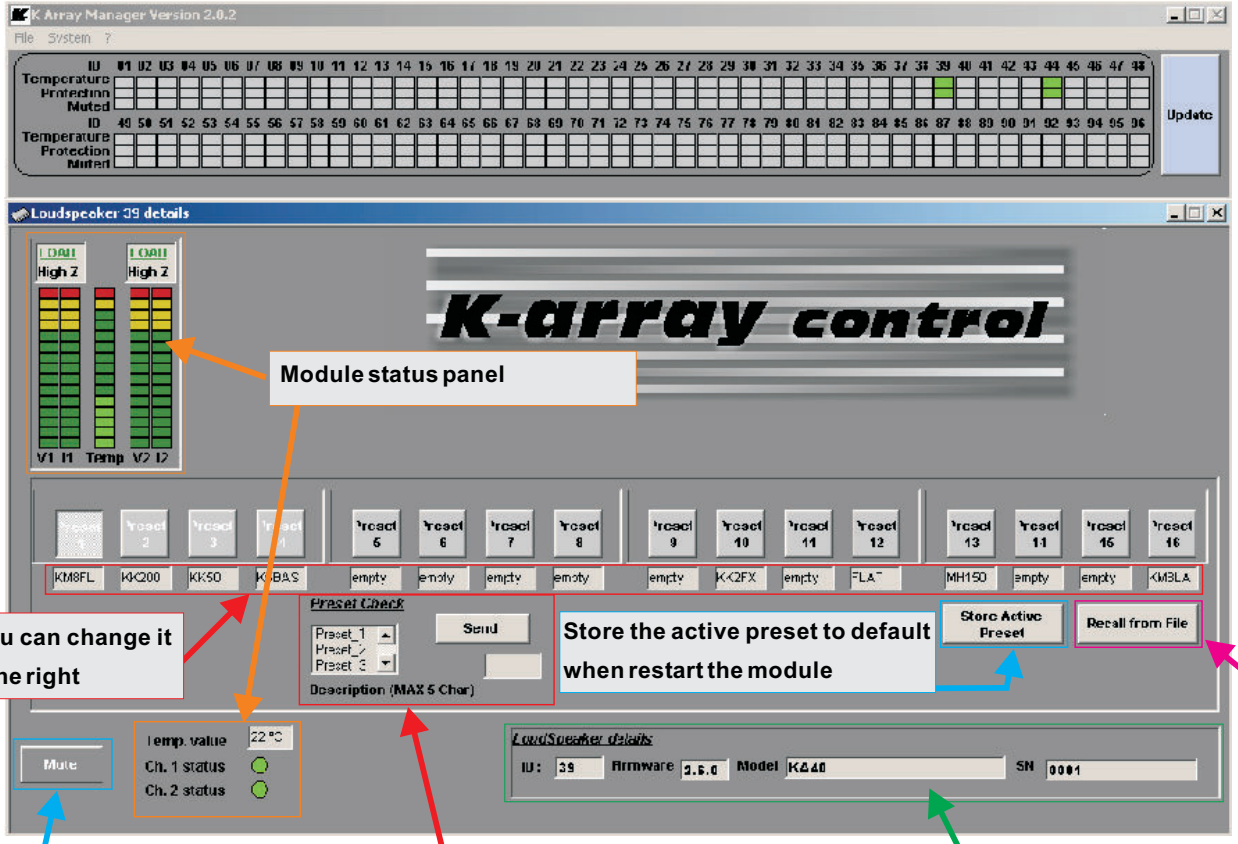
Pressing this button you can have a refresh of the modules connected.



4 . Single module control



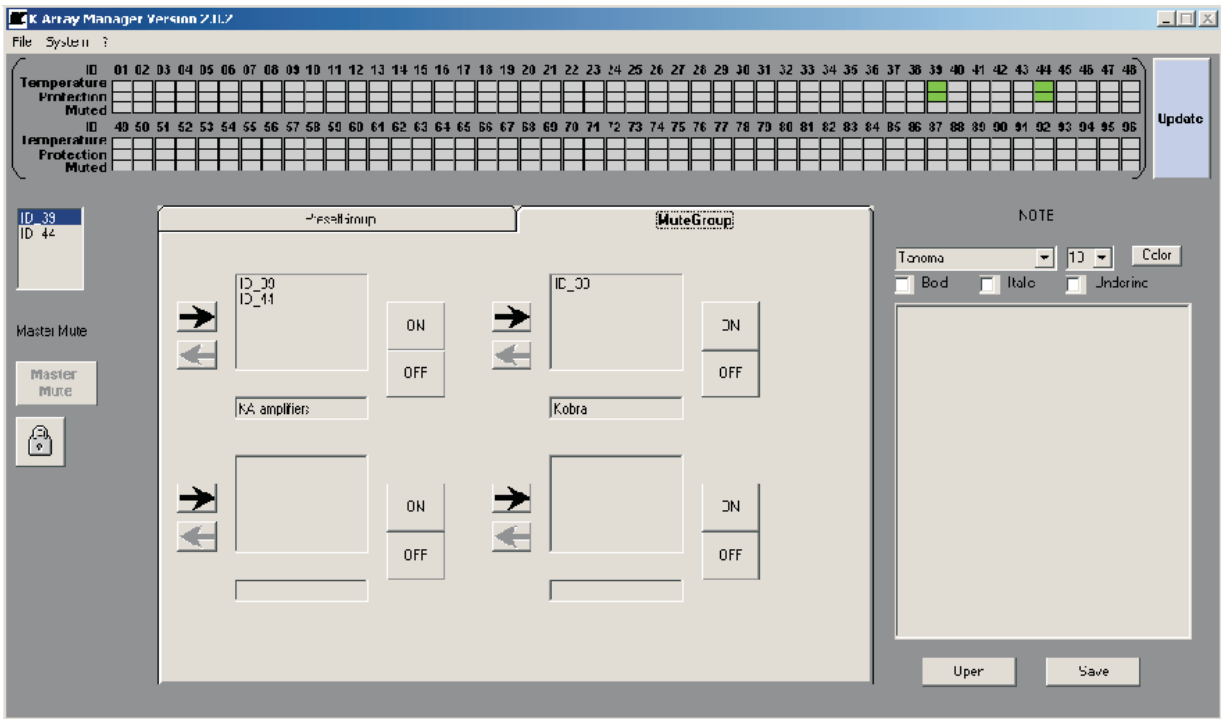



K Array Manager Version 2.0.2
Update
Loudspeaker 39 details
K-array control
Module status panel
Preset names, you can change it from the area on the right
Store the active preset to default when restart the module
Recall from File
Mute
Mute Module
Select the preset number, write the name, maximum 5 characters, press the Send button
Module details
With this button, you can load presets from PC to the module, you have to press, choose the slot that you want use and select the .EQS file that you want to load.

5. Mute groups

On the Mute Groups window, you can manage the modules Mute as groups, up to 4 different.

5.1 Choose the modules from the list on the right
Press the right arrow of the group that you prefer, to add the modules

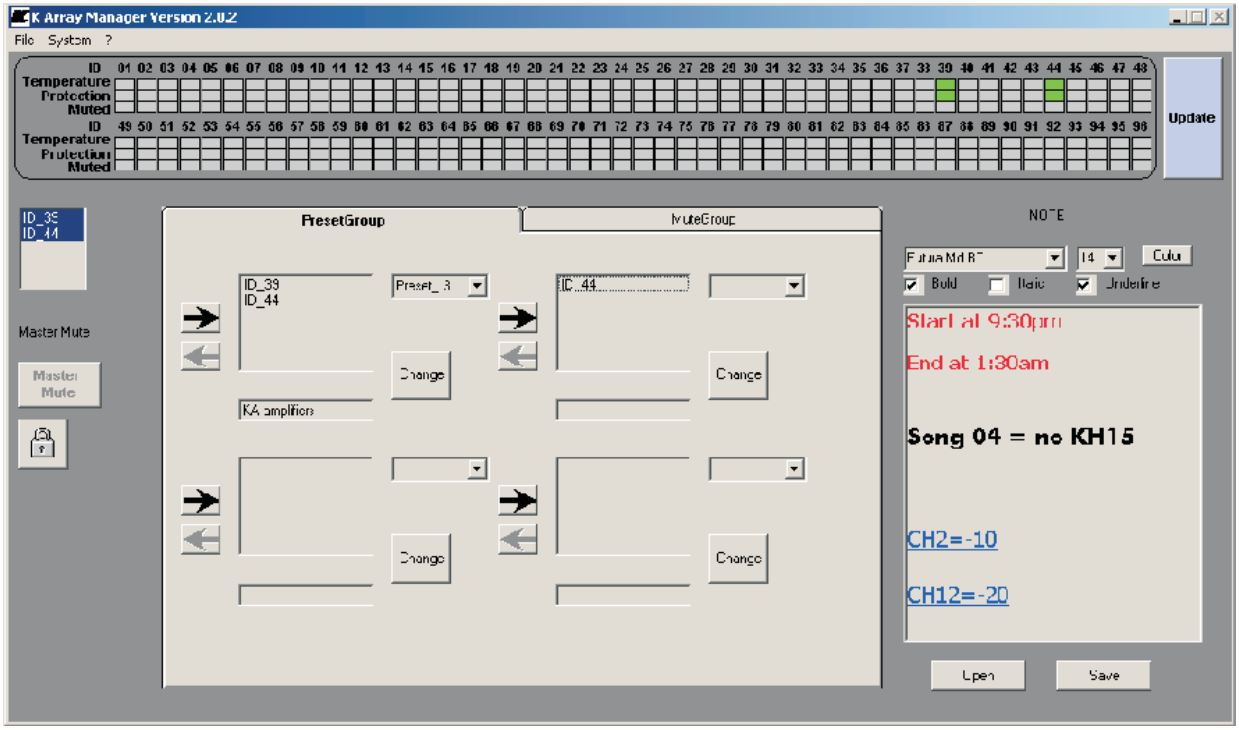


5.2 It is possible to assign names to the groups, just writing in the fields.

6. Preset groups

On the Preset Groups window, you can manage the modules Presets as groups, up to 4 different.

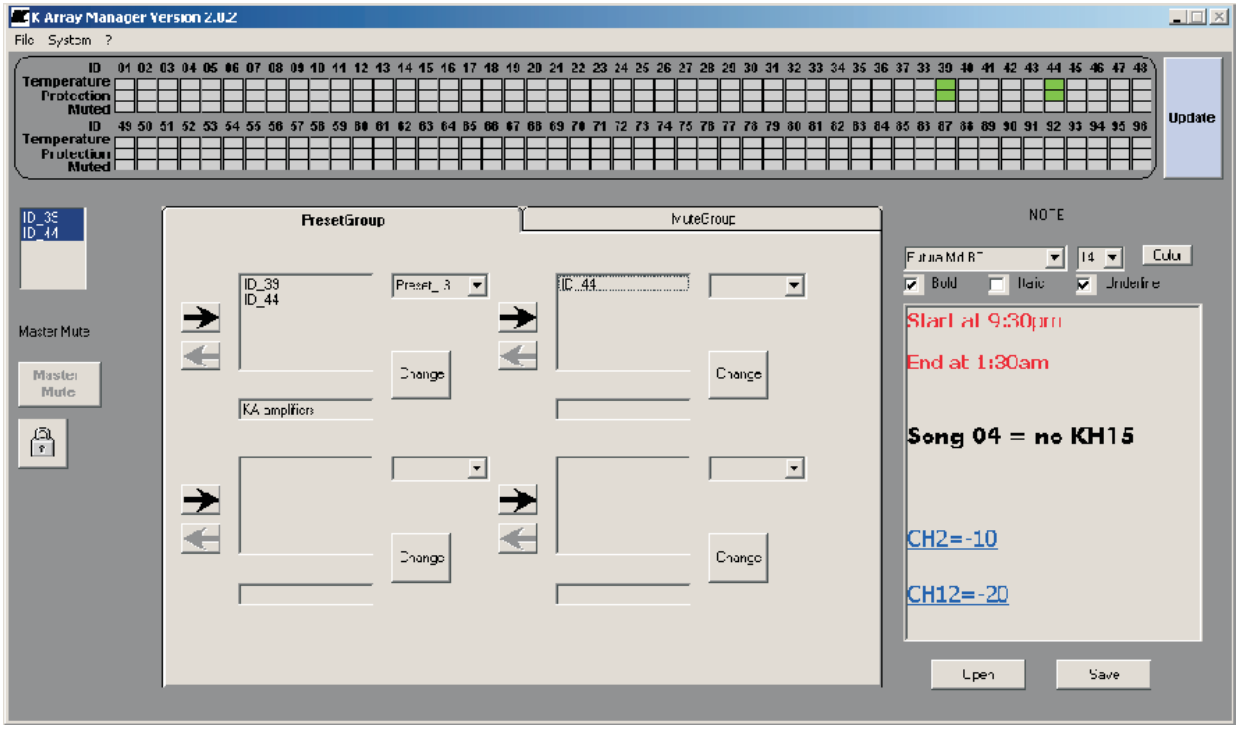
6.1 Choose the modules from the list on the right
Press the right arrow of the group that you prefer, to add the modules
Select the number of the preset you want to choose, after press Change button



6.2 It is possible to assign names to the groups, just writing in the fields.

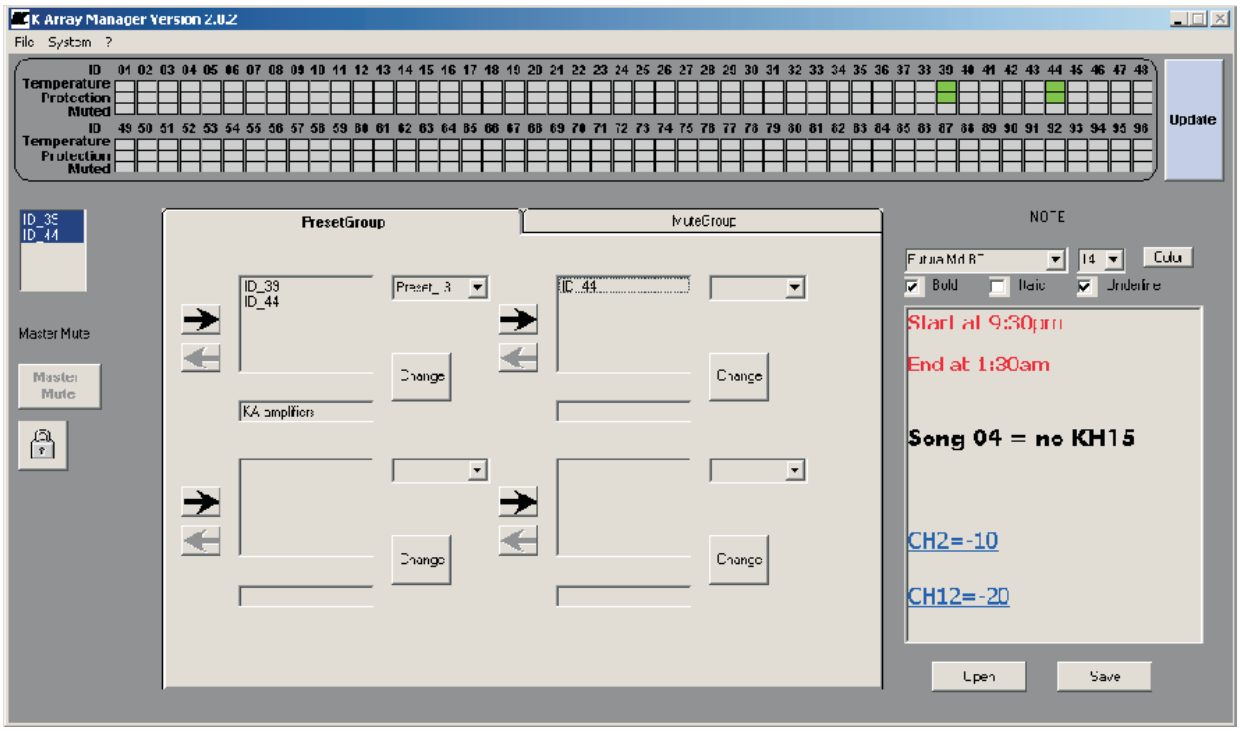
7. Text editor

It is available a text editor on the software, it can manages .RTF files.



8. Master Mute control

It is possible to Mute all the modules connected just pressing Master Mute button.
To protect from accidental pressing of this button, you will need to Unlock by pressing the Unlock button below it.



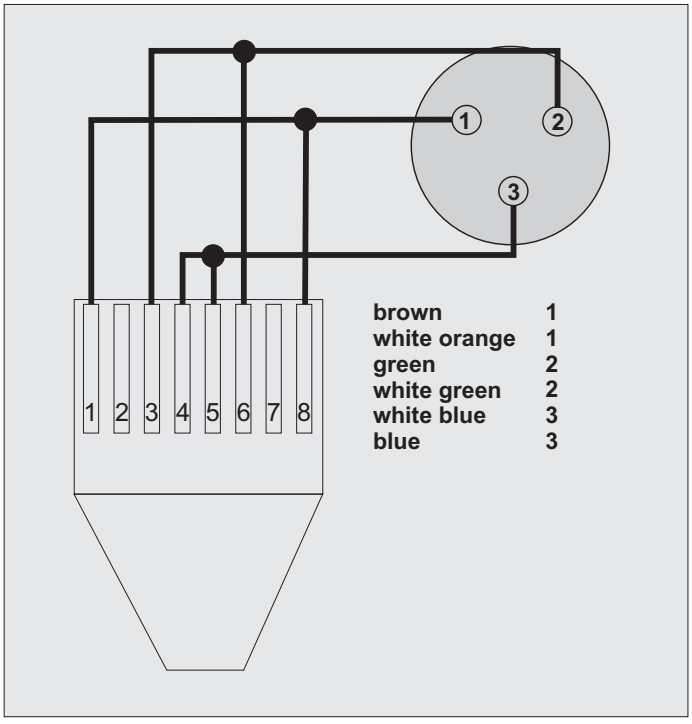
9. Exit option

When you choose to exit from the software, will appear an alert window that alert you about Unmuting all the modules connected, this is important because the Mute function is controlled only by software.

10. Save and Load

It is possible to save the speakers configuration for Mute and Preset Groups, just Save a .CONF file.

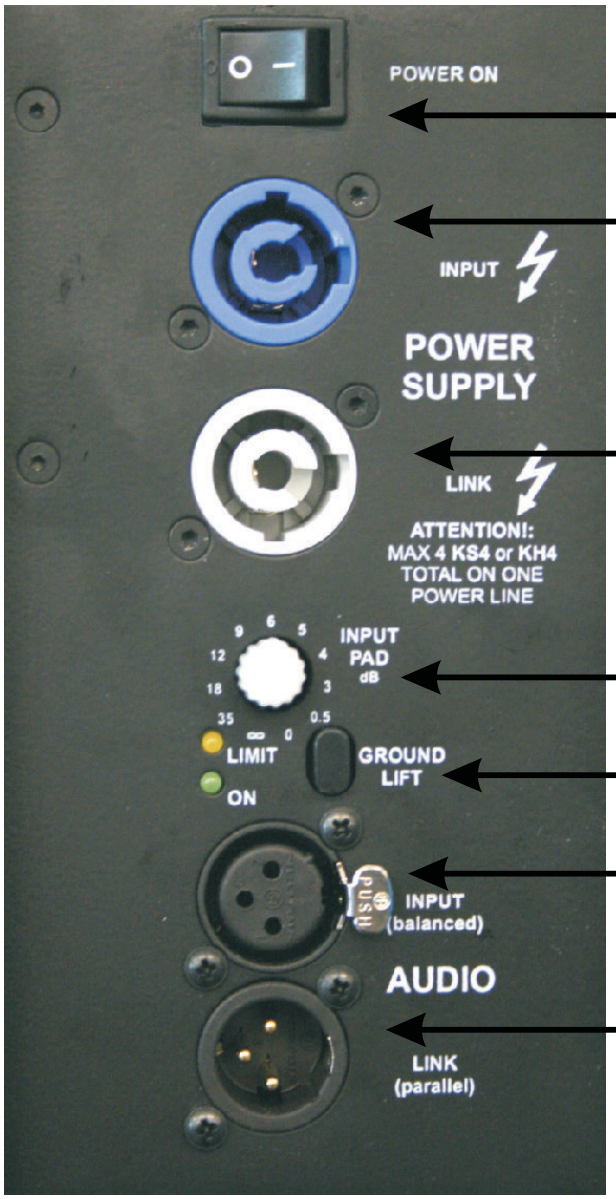
It is possible to use XLR adapters for connections, here below, the connection schematic.



10. POWER SUPPLY & AUDIO SECTION

KH4, KS4 and KH15 modules are using PowerCon connectors for power supply. It is possible, using the link connector, to have more modules on the same power supply line. You can wire a max of 4 modules on the same line if the use of them will be within the 50% of their max power. For full power use connect max two modules on the same power supply line.

The Audio section includes a female balanced XLR connector and a male XLR connector wired in parallel. Thanks to these connectors it is possible to feed a module and to send the same signal to another one through the LINK connector. It is possible to connect till 30 different modules in parallel on the same balanced line (with a source of 600 ohm output impedance). A Level Control potentiometer (PAD) allows different set levels. The ground lift switch can help to solve ground loop problems due to wrong ground wiring.



MAIN POWER SWITCH

MAIN AC POWER SUPPLY IN

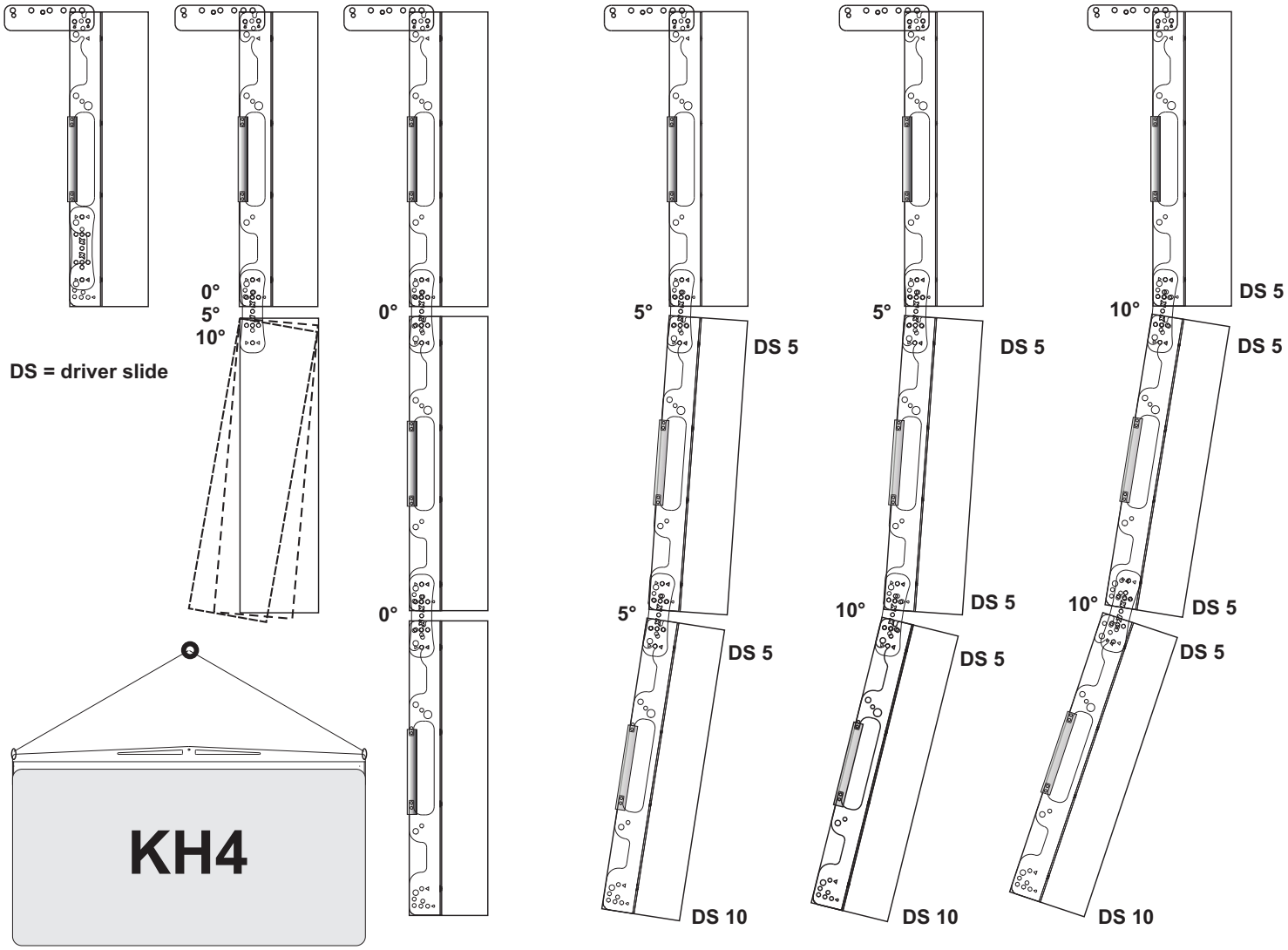
MAIN AC POWER SUPPLY LINK OUT

AUDIO LEVEL

GROUND CIRCUIT LOOP SWITCH

BALANCED AUDIO INPUT

BALANCED AUDIO PARALLEL LINK

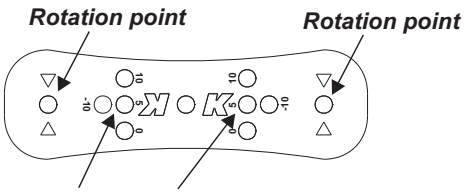


KH4 System Spl calculations

System	Vert. Coverage	SPL @1mt
2 x KH4 + 4 x KS4	From 7° to 37°	140dB +/- 3dB
4 x KH4 + 8 x KS4	From 7° to 47°	146dB +/- 4dB
6 x KH4 + 12 x KS4	From 7° to 57°	150dB +/- 6dB

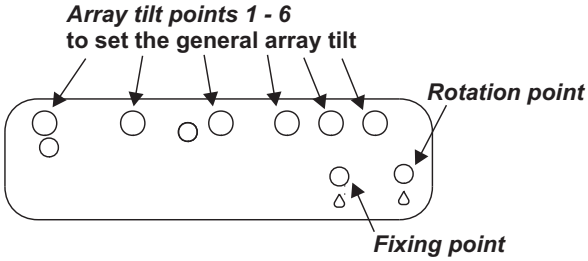
System	SPL @ 10mt	SPL @ 20mt	SPL @ 40mt	SPL @ 80mt
2 x KH4 + 4 x KS4	128dB	124dB	118dB	112dB
4 x KH4 + 8 x KS4	134dB	130dB	124dB	118dB
6 x KH4 + 12 x KS4	138dB	134dB	128dB	122dB

K4BUTTERFLY

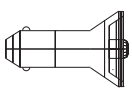


Tilt degrees settings
set the same value on each speaker for the right tilt angle

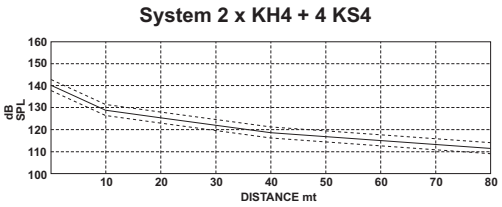
K4TILTER

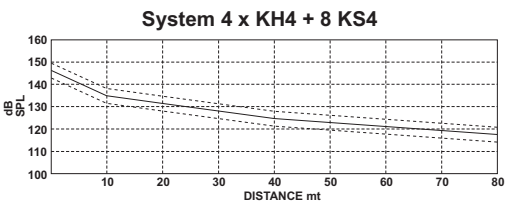


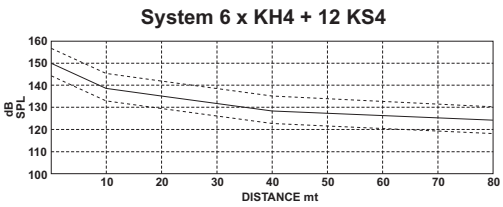
KPIN



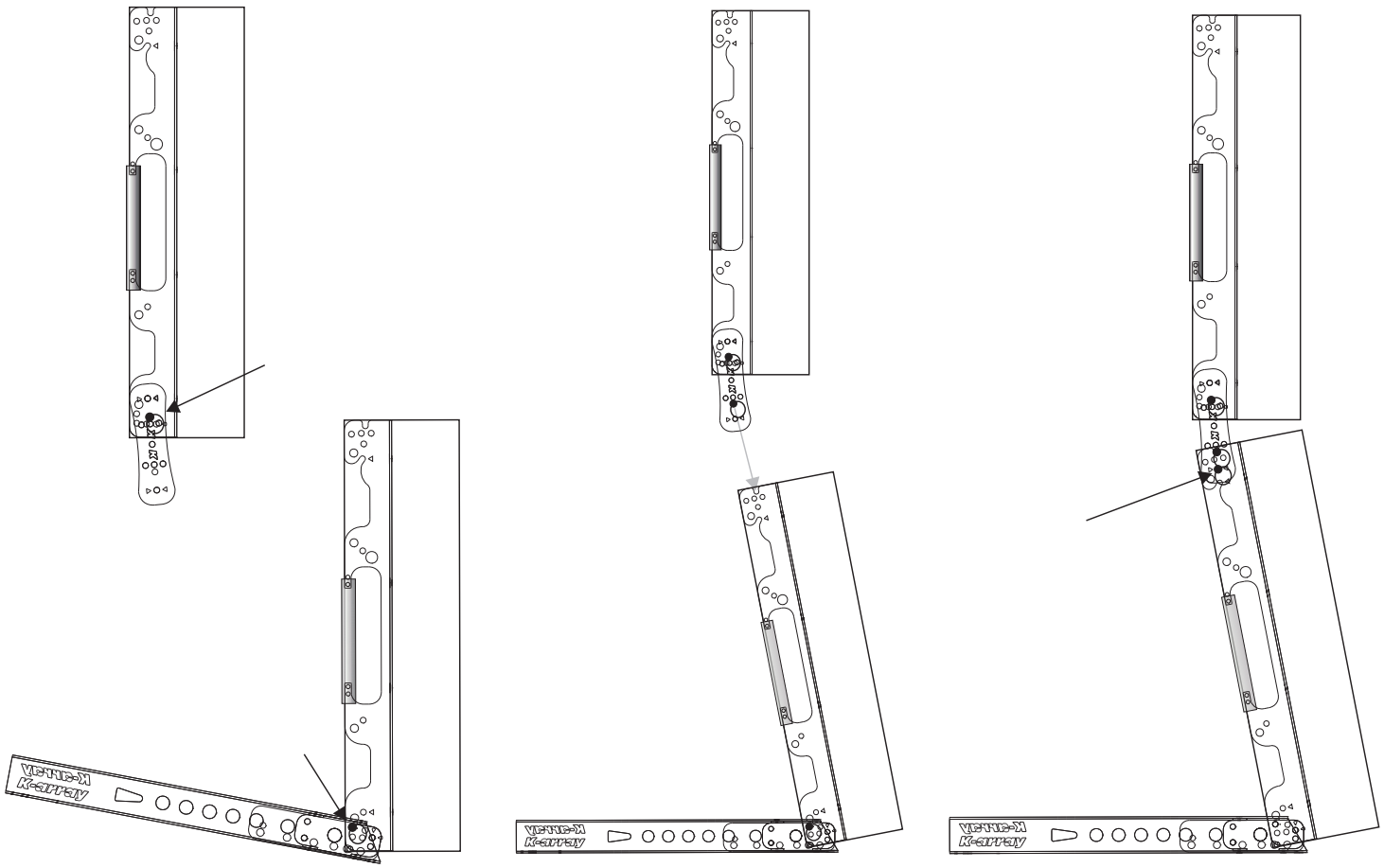
11.1 SYSTEM COVERAGE



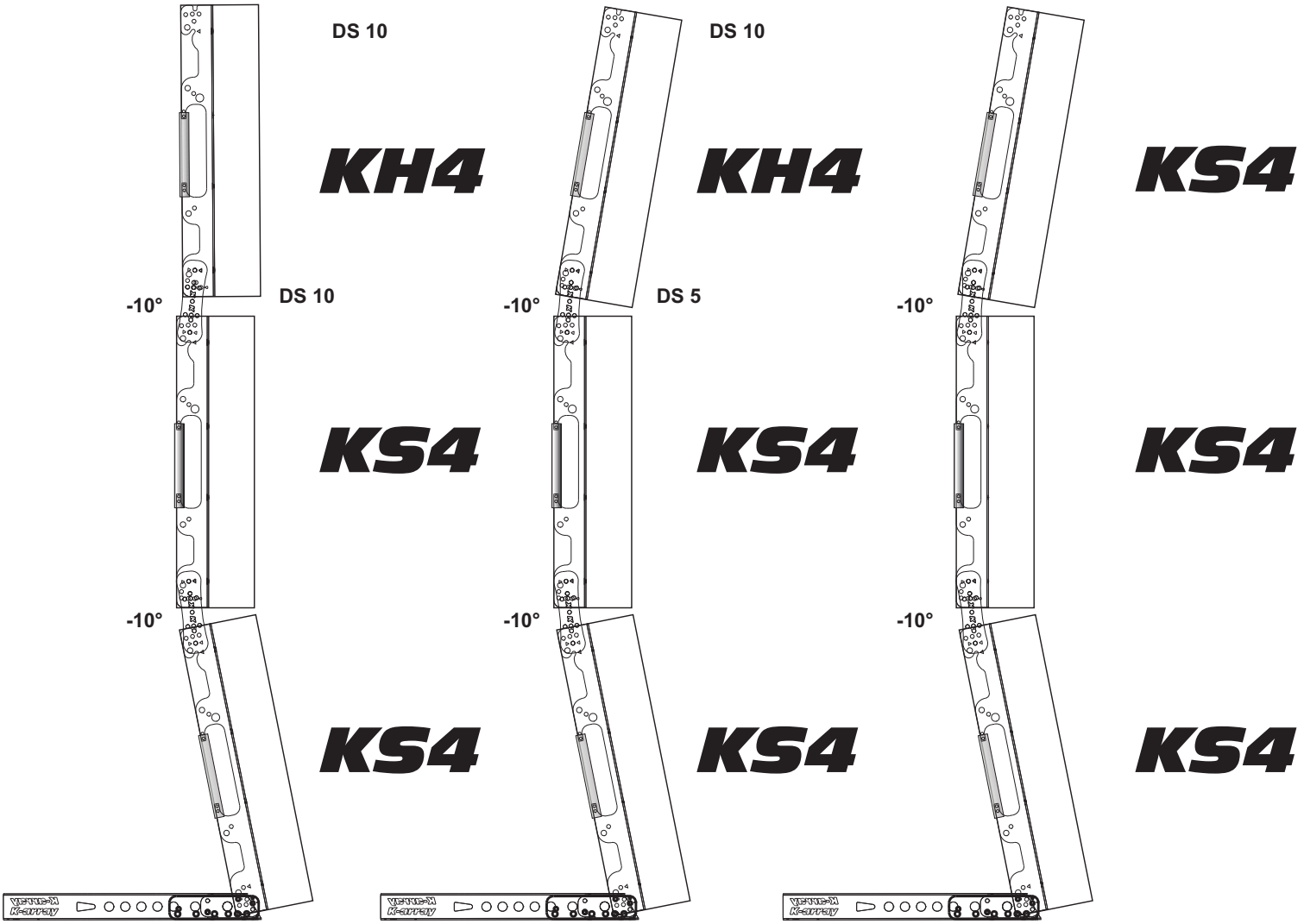




11.2 SHORT INSTALLATION MANUAL



12. SYSTEM CONFIGURATION on the floor

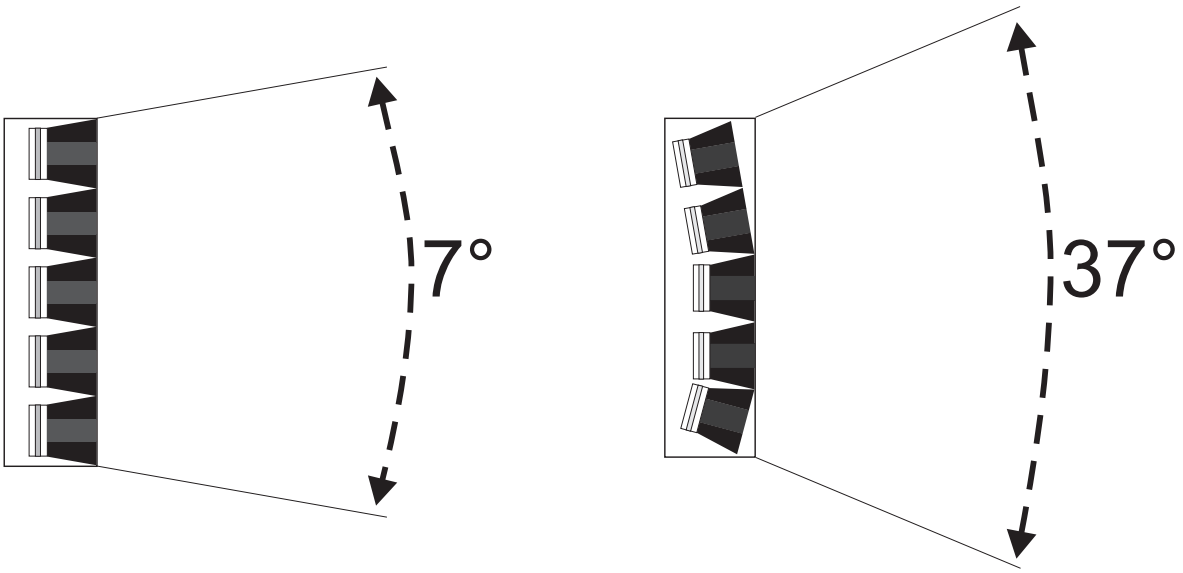


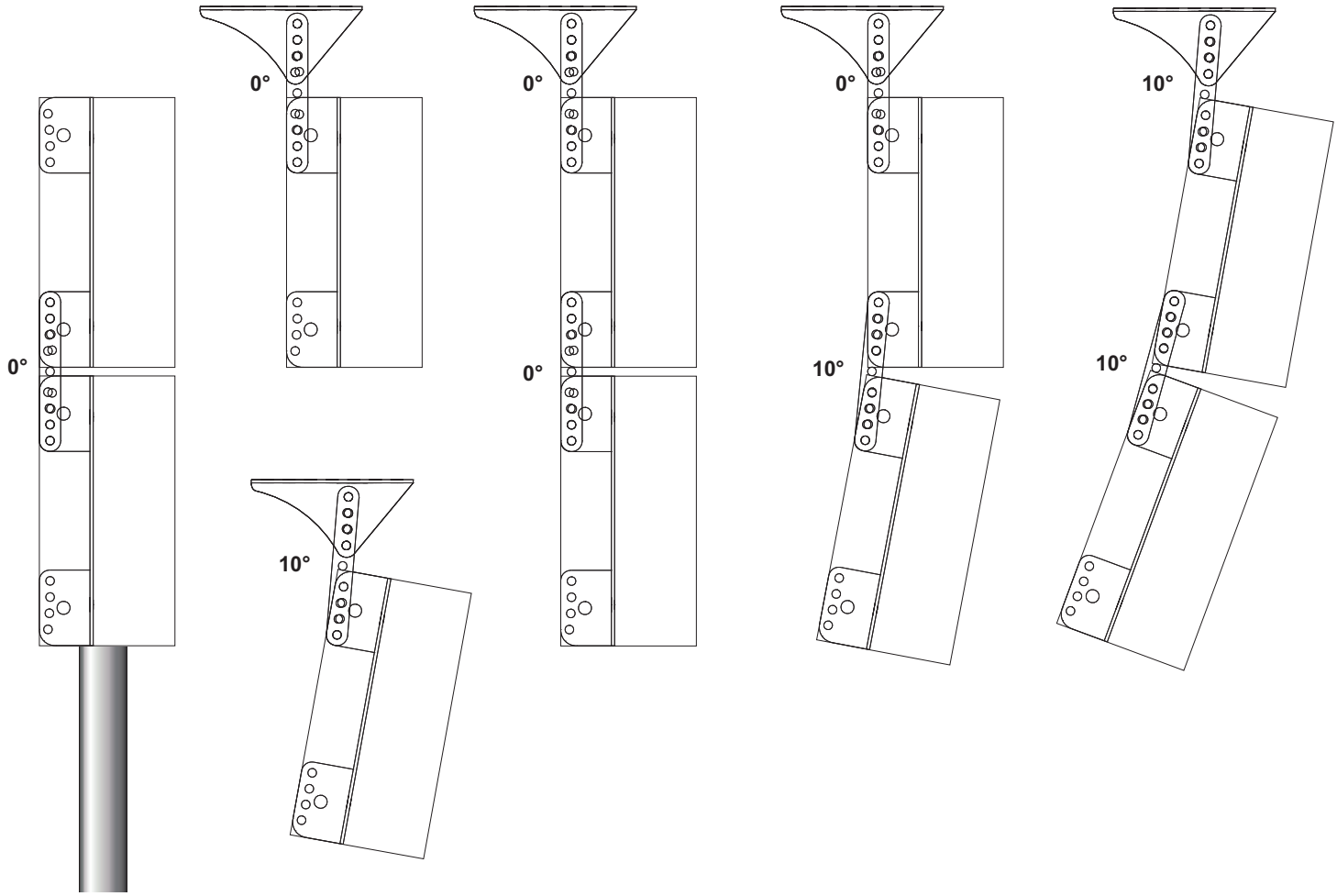
For floor applications you can set up a maximum of 3 speakers each K-feet4

For flying applications you can append a maximum of 4 KH4 each K-fly4

13. VARIABLE VERTICAL COVERAGE

The KH4 is equipped with 2 driver slides. So that you can set up the preferred vertical coverage of the speaker.



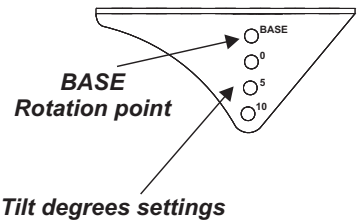


KH15 System Spl calculations

System	Vert. Coverage	SPL @1mt
2 x KH15 + 2 x KS4	15°	132dB
4 x KH15 + 4 x KS4	From 15° to 25°	138dB +/- 2dB
6 x KH15 + 8 x KS4	From 15° to 35°	140dB +/- 4dB
8 x KH15 + 10 x KS4	From 15° to 45°	144dB +/- 6dB

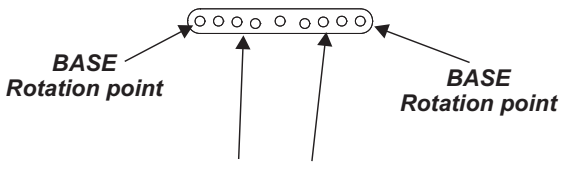
System	SPL @ 10mt	SPL @ 20mt	SPL @ 40mt	SPL @ 80mt
2 x KH15 + 2 x KS4	120dB	116dB	110dB	104dB
4 x KH15 + 4 x KS4	126dB	122dB	116dB	110dB
6 x KH15 + 8 x KS4	128dB	124dB	118dB	112dB
8 x KH15 + 10 x KS4	132dB	128dB	122dB	116dB

K15ARRAY



Tilt degrees settings
to set the same value on each speaker for the right tilt angle

K15BUTTERFLY



Tilt degrees settings
to set the same value on each speaker for the right tilt angle

CAUTION

Please read this statement carefully and in its entirety. It contains important information regarding safety issues, including guidelines for general safe use of rigging systems as well as advisories on government regulations and liability laws.

SCOPE OF THIS MANUAL

Although this manual contains much useful information on rigging in general, it does not claim to be a comprehensive resource on the subject. This manual assumes that the owners and/or users of a K-array System are knowledgeable and experienced in the areas of rigging and flying loudspeaker systems.

MANY ISSUES OF CRUCIAL CONCERN, SUCH AS THE DETERMINATION OF APPROPRIATENESS AND CONDITION OF VENUE RIGGING POINTS, CANNOT BE ADDRESSED HERE. THEREFORE, THE USER MUST ASSUME ALL RESPONSIBILITY FOR THE APPROPRIATE USE OF K-ARRAY SYSTEMS IN ANY PARTICULAR LOCATION OR CIRCUMSTANCE.

The suspension of large, heavy objects in public places is subject to numerous laws and regulations at the national/federal, state/provincial, and local levels. This manual does not address the specifics of any such applicable laws and government regulations. This manual details procedures and practices consistent with those generally acknowledged as allowable and safe in Europe. However, the user must assume responsibility for making sure that use of any K-array system and its components in any particular circumstance or venue conforms to all applicable laws and regulations in force at the time.

REGULATORY COMPLIANCE

The design and safe working load ratings of the K-array system, unless otherwise specified, are based on either a 5:1 or 7:1 safety factor. However there are wide variations internationally in the regulations and practices applying to suspension of sound systems in public places. Government officials in one location may have a stricter interpretation than another local official, even when operating under the same regulations and in the same legal jurisdiction.

CONSEQUENTLY, USERS OF K-array RIGGING SYSTEMS SHOULD BE PREPARED TO TAKE ADDITIONAL SAFETY ASSURANCE MEASURES BEYOND THOSE OUTLINED IN THIS MANUAL. IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO MAKE CERTAIN THAT ANY K-array LOUDSPEAKER SYSTEM IS SUSPENDED IN ACCORDANCE WITH ALL APPLICABLE NATIONAL/FEDERAL, STATE/PROVINCIAL, AND LOCAL REGULATIONS. SAFETY RESPONSIBILITIES "ABOVE THE HOOK"

In most touring applications of rigging systems, the touring sound provider is normally responsible for ensuring the safety of the suspension system only below the attachment point. The safety and suitability of the attachment point is generally seen as the responsibility of the venue owner or operator. However, this distinction ("above the hook" versus "below the hook") can be open to interpretation. Touring system operators should double-check to make certain that attachment points are approved and suitably load rated, and that the points used are those identified as such by the venue owner or operator.

CAUTION

As an extra precaution, careful inspection of the attachment points is advised before flying, particularly in older venues or those hosting frequent events using large sound and lighting systems.

In any case, K-array systems are intended only for suspension from approved rigging points, each known to have ample safe working loads margins for the system components suspended below them.

INSPECTION AND MAINTENANCE

The K array flying systems are an assembly of mechanical devices, and are therefore subject to wear and tear over prolonged use, as well as damage from corrosive agents, extreme impact, or inappropriate use. Such inspection includes examination of all load-bearing components for any sign of undue wear, twisting, buckling, cracking, rusting, or other corrosion. Metal seams and welds should be examined for any sign of separation or deformation. HP Sound Equipment strongly recommends that written documentation be maintained on each K array flying system, noting date of inspection, name of inspector, points of system checked, and any anomalies discovered.

CAUTION

Because of the safety issue involved, users must adopt and ad here to a schedule of regular inspection and maintenance. In touring applications, key components must be inspected be for each use.

REPLACEMENT PARTS

Any component found to be defective, or any safety-related component you even suspect might be defective, should be replaced with the equivalent, approved part. Parts specific to a K array system should be ordered directly from HP Sound Equipment. No attempt should be made to substitute what appears to be equivalent or “mostly the same” generic replacements. To the best of our knowledge, most of these suppliers are reputable and their products are reliable. However, HP Sound Equipment has no way of assuring the quality of products made by these various suppliers. Therefore, HP Sound Equipment is not responsible for problems caused by components that were not supplied by HP Sound Equipment.

KH15

0	=	KH15F	Flat
1	=	KH15M	Mid
2	=	KH15H	High
3	=	KH15Q	"Hi-Hat" EQ
4	=	KH15IN	Warm indoor EQ
5	=	KH15VX	Speech EQ or BG music
6	=	KH15GN	Flat Studio EQ
7	=	KH15FLP	Flat + PAD -4dB
8	=	KH15MP	Mid + PAD -4dB
9	=	KH15HP	High + PAD -4dB
10	=	KH15F	
11	=	KH15M	
12	=	KH15H	
13	=	KH15Q	
14	=	KH15IN	
15	=	KH15VX	

Preset names indicates:
Speaker model
The number of speakers installed
Position of the speaker to the others
Code and preset release

Example: *KH432F01*
Preset for KH4 speaker
3 x KH4 per side
central position (second one from the top)
EQ F1 (flat rev1)

KH4

0	=	KH4FL	Flat
1	=	KH4FL	Indoor EQ
2	=	KH4M	Mid
3	=	KH4MP	Mid + PAD -4dB
4	=	KH4H	High
5	=	KH4HP	High + PAD -4dB
6	=	KH4Q	"Hi-Hat" EQ
7	=	KH4QP	"Hi-Hat" EQ + PAD -4dB
8	=	KH4FULL	"fullrange" preset
9	=	KH421F	Array Configuration x 2 speakers 1° position (from top)
10	=	KH422F	Array Configuration x 2 speakers 2° position (from top)
11	=	KH431F	Array Configuration x 3 speakers 1° position (from top)
12	=	KH432F	Array Configuration x 3 speakers 2° position (from top)
13	=	KH433F	Array Configuration x 3 speakers 3° position (from top)
14	=	KH4FL	Flat
15	=	KH4FL	Indoor EQ

KS4

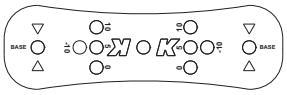
0	=	KS4FL02	Flat preset
1	=	KS4XT45	Extended low frequencies preset
2	=	KS4XT12	Emphasis at 120Hz
3	=	KS4101	For stand alone applications
4	=	KS4F02_1	Flat preset with 1ms delay
5	=	KS4F02_2	Flat preset with 2ms delay
6	=	KS4F02_3	Flat preset with 3ms delay
7	=	KS4XT200	Extended at 200Hz

18. Details & Accessories

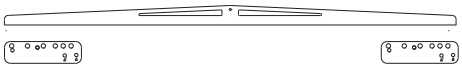
KH4

139 dB @1mt MAX Continuous Spl
100-19,000 Hz Frequency Range +/-3dB
100° Nominal Horizontal Coverage

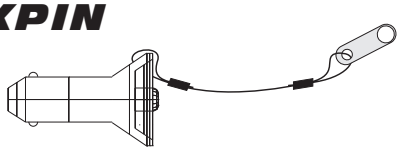
KBUTTERFLY4



KFLY4



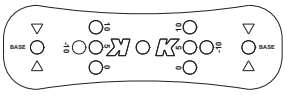
KPIN



KS4

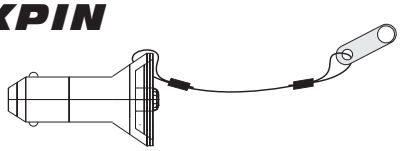
136 dB @1mt MAX Continuous Spl
38-150 Hz Frequency Range +/-3dB
100° Nominal Horizontal Coverage

KBUTTERFLY4



KFEET4

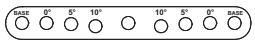
KPIN



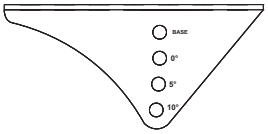
KH15

130 dB @1mt MAX Continuous Spl
100-19,000 Hz Frequency Range +/-3dB
100° Nominal Horizontal Coverage

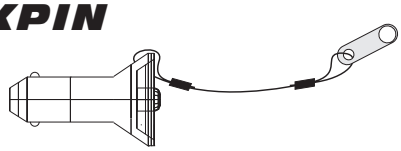
KBUTTERFLY15



KFLY15

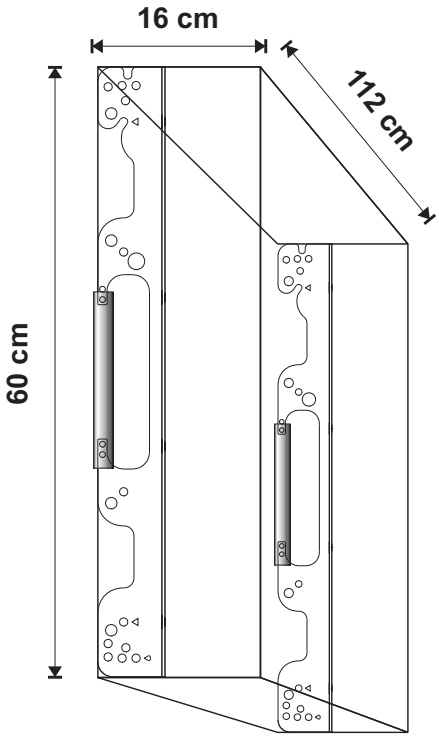


KPIN



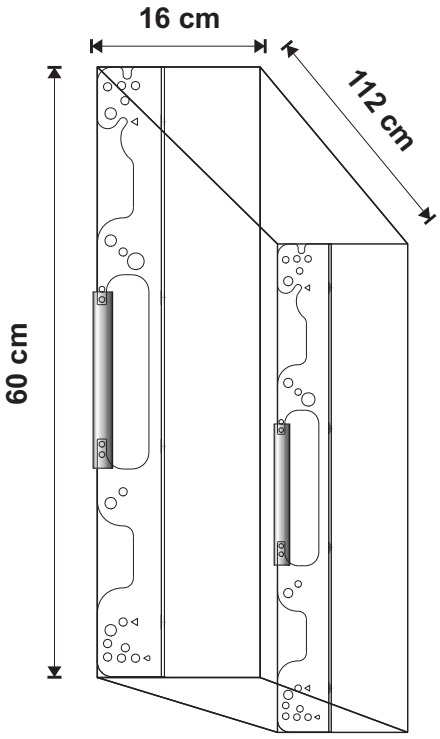
19. Physical

KH4



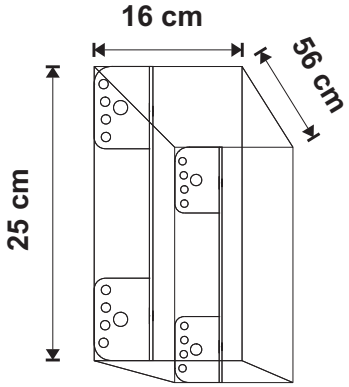
Weight 47Kg

KS4



Weight 37Kg

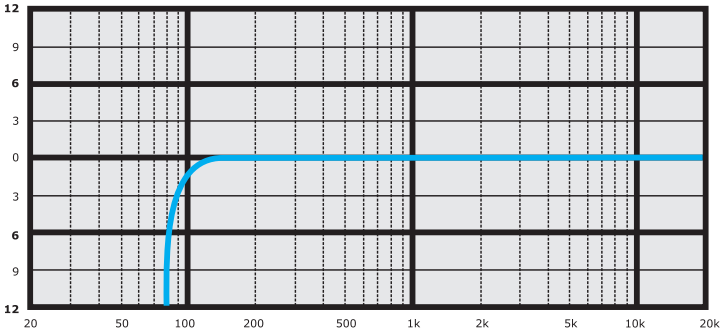
KH15



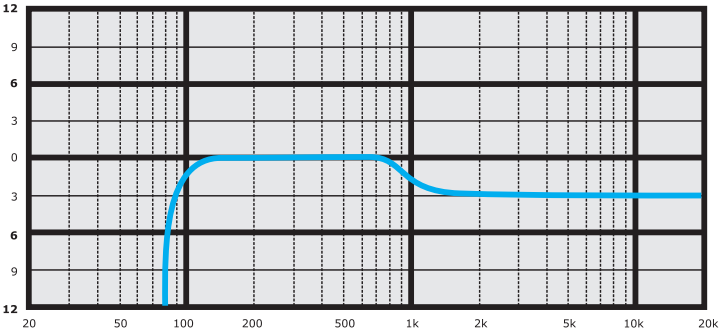
Weight 12Kg

KH4 Presets

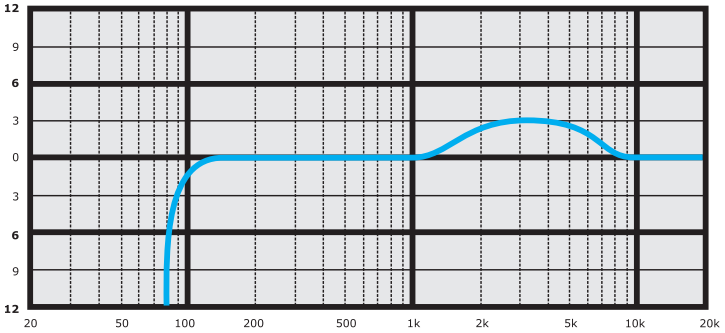
KH4FL - Flat preset



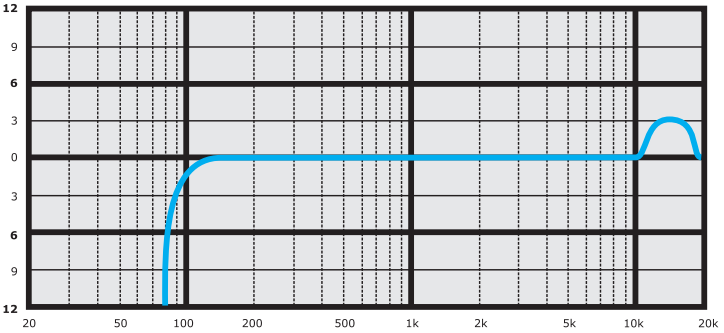
KH4FL02



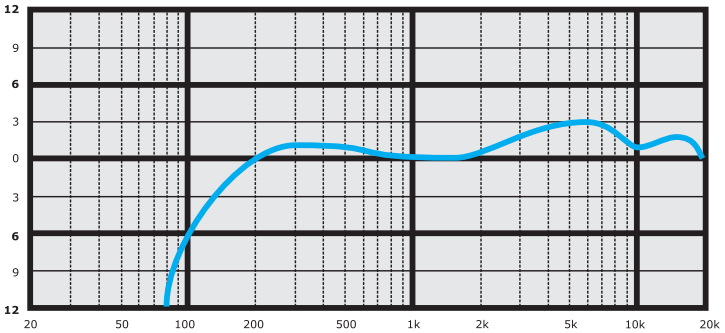
KH4M01



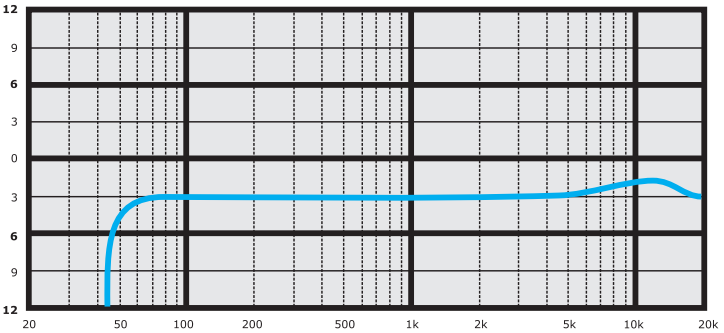
KH4H01



KH4Q

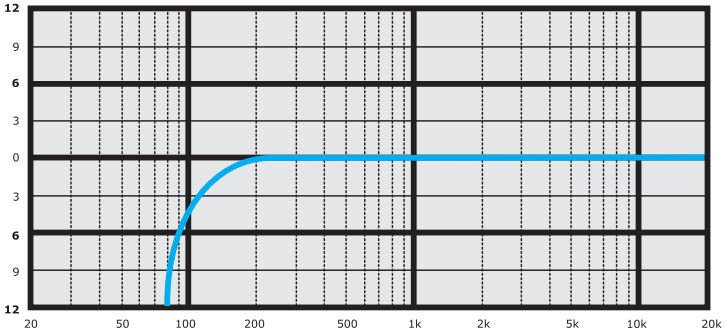


KH4FULL

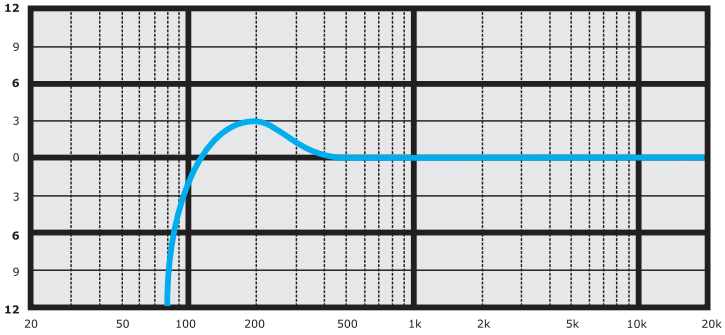


KH15 Presets

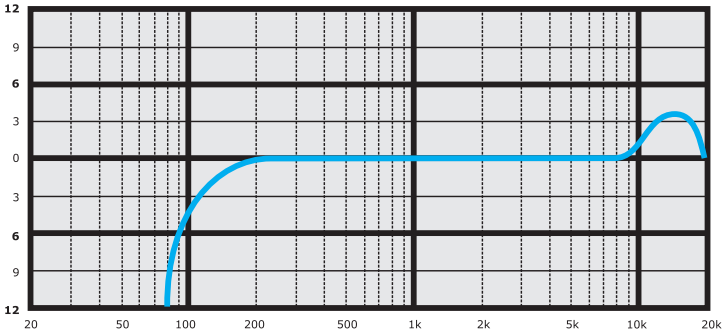
KH15F - Flat preset



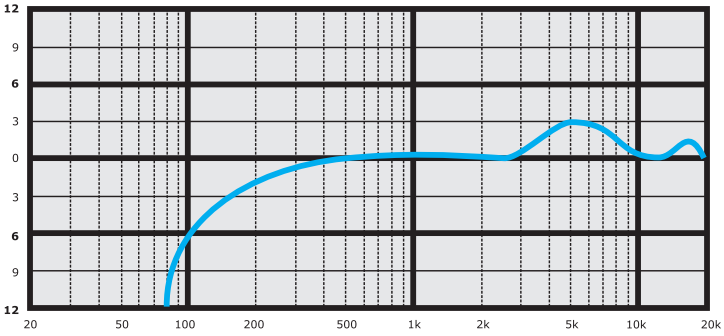
KH15M



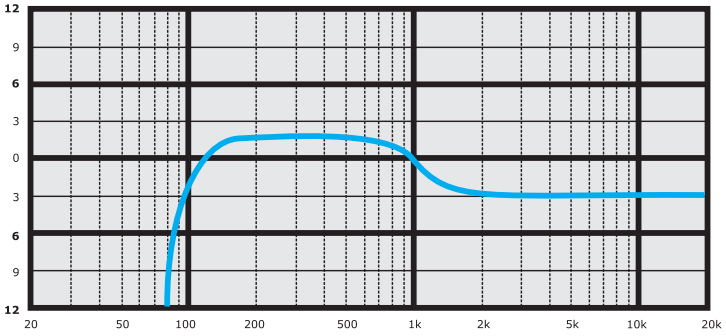
KH15H



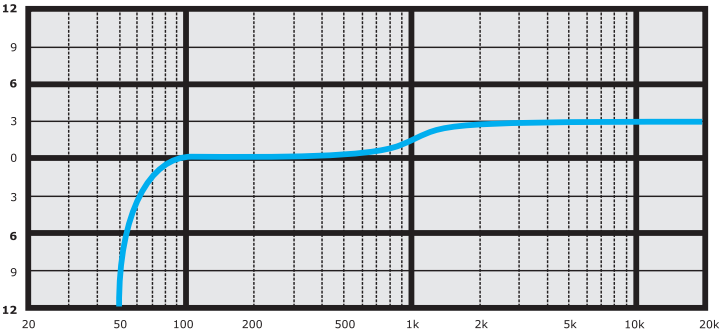
KH15Q



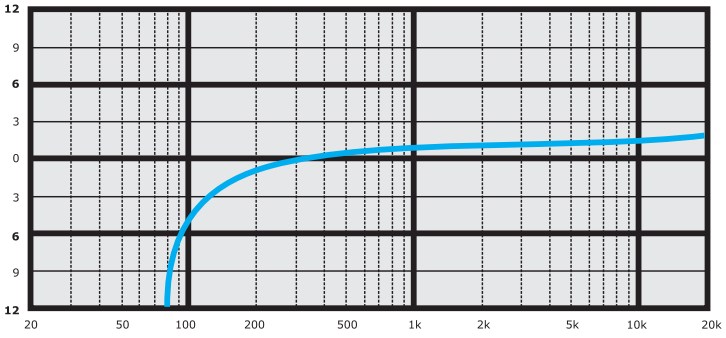
KH15IN



KH15VX

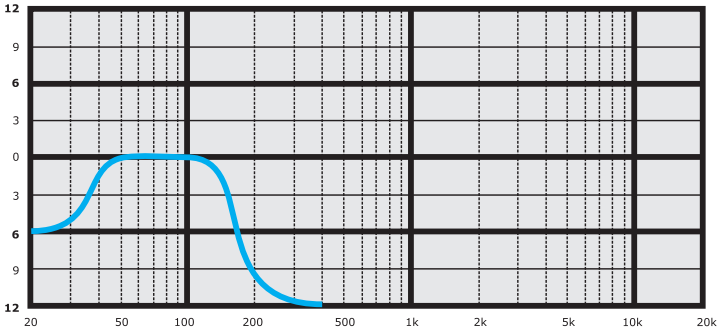


KH15GN

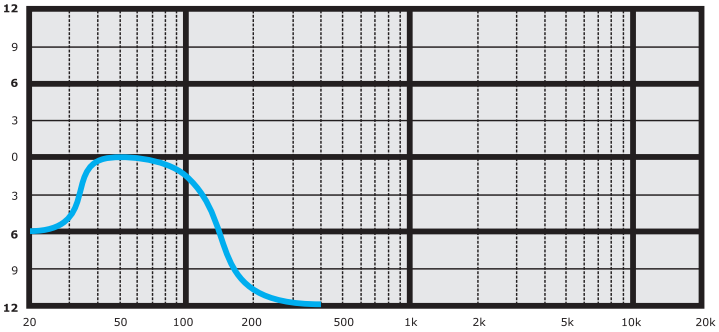


KS4 Presets

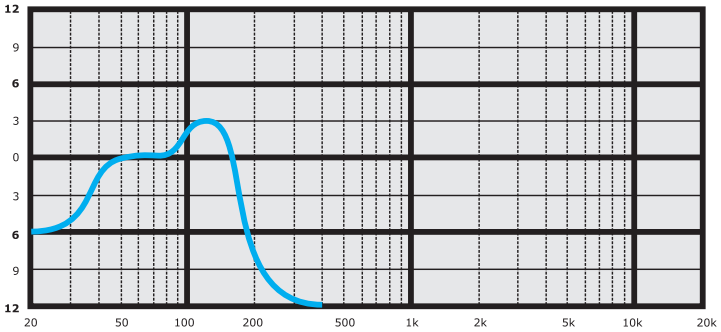
KS4FL - Flat preset



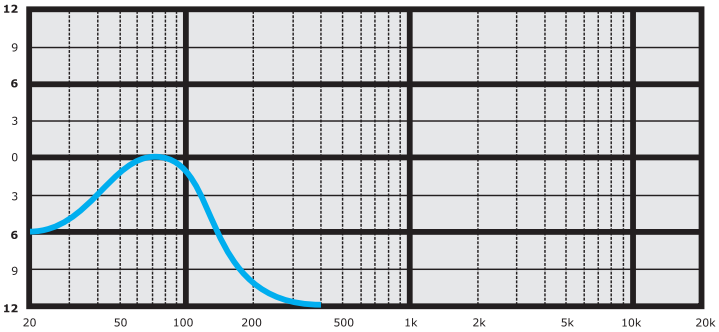
KS4XT45



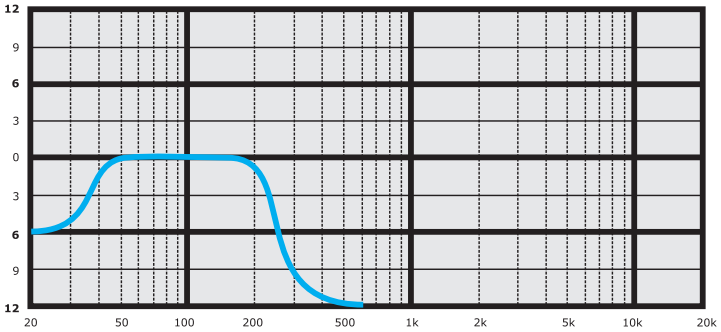
KS4XT12



KS4101

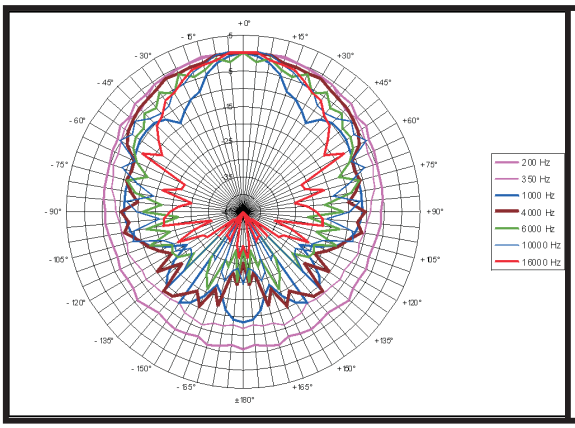


KS4XT200

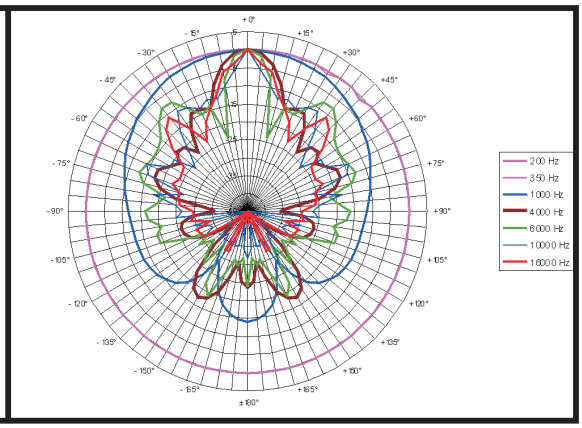


KH15 polar response

HORIZONTAL COVERAGE

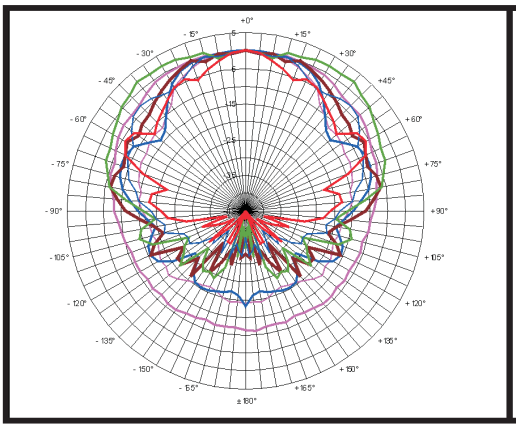


VERTICAL COVERAGE

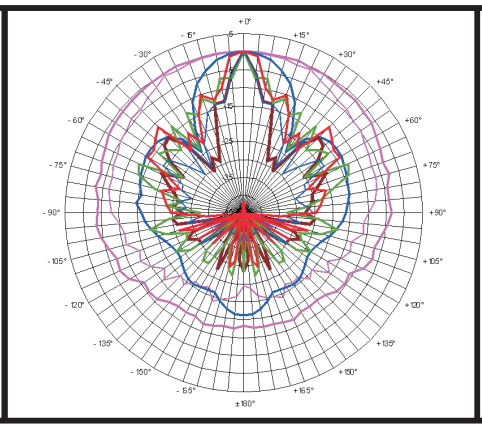


KH4 polar response

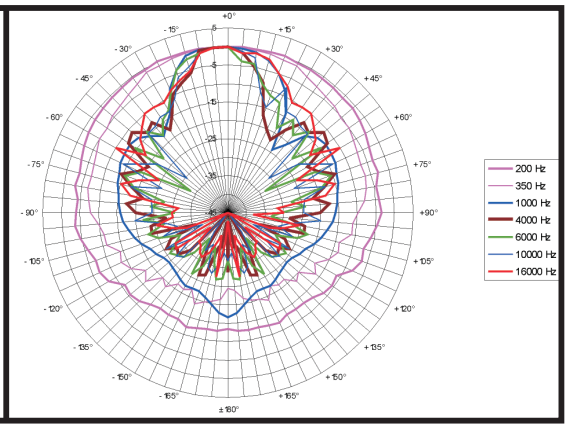
HORIZONTAL COVERAGE



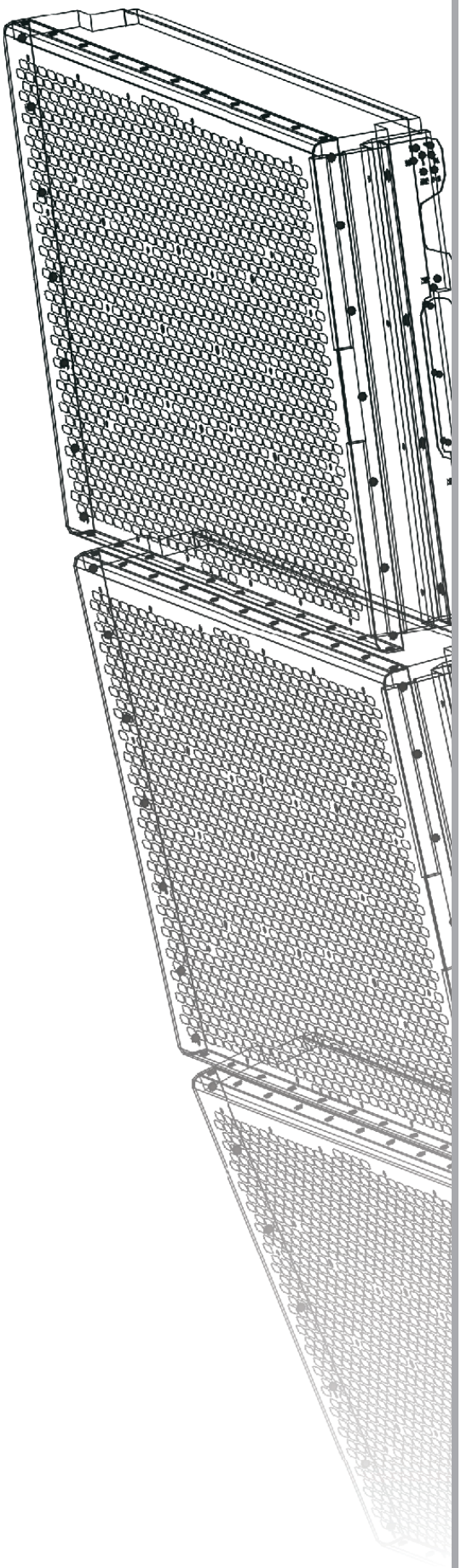
VERTICAL COVERAGE Close



VERTICAL COVERAGE Open



K-NOTES



K-array System - www.k-array.com

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